

What is claimed is:

1. A water insoluble extraction reagent composition comprising: (a) an extractant selected from the group consisting of an aldoxime, a ketoxime, or a combination thereof; (b) an equilibrium modifier having a Brookfield viscosity of equal to or less than about 5 centapoise at 25°C and a flash point equal to or greater than about 141°F wherein the molar ratio of modifier to extractant is from about 0.05 to about 2.0 so as to provide a net copper transfer greater than that achieved in the absence of modifier.
2. The composition of claim 1 wherein the modifier is selected from the group consisting of: alcohols, carboxylic acid esters, oximes, nitriles, ketones, amides, carbamates, sulfoxides, ureas, and phosphine oxides.
3. The composition of claim 2 wherein the modifier is selected from the group consisting of nitriles, ether nitriles, di-alkyl ethers, ketones, esters, and alcohols.
4. The composition of claim 1 further comprising an  $\alpha$ -hydroxy oxime, an  $\alpha,\beta$ -dioxime or a combination thereof as a kinetic additive.
5. The composition of claim 4 wherein the  $\alpha$ -hydroxy oxime is 5,8-diethyl-7-hydroxy dodecane-6-oxime.
6. The composition of claim 4 wherein the dioxime is a mixture of 1-(4'-alkylphenyl)-1,2-propanedione dioximes.
7. The composition of claim 1 wherein the extractant is 5-nonylsalicylaldoxime, 5-dodecylsalicylaldoxime, 5-octylsalicylaldoxime, 5-heptylsalicylaldoxime, and the 2-hydroxy-5-nonylacetophenone oxime and mixtures thereof.
8. The composition of claim 1 wherein the modifier is 2,6,8-trimethyl-4-

nonanone.

9. A process for recovery of copper from an aqueous solution containing copper values comprising (1) contacting the aqueous solution with an organic  
5 phase comprising a water insoluble and water immiscible solvent solution of an extraction reagent composition comprising: (a) an extractant selected from the group consisting of an aldoxime, a ketoxime, or a combination thereof; (b)  
an equilibrium modifier having a Brookfield viscosity of equal to or less than  
10 141°F wherein the molar ratio of modifier to extractant is from about 0.05 to about 2.0 so as to provide a net copper transfer greater than that achieved in the absence of modifier; (2) separating the resultant copper pregnant organic phase from the resultant copper barren aqueous phase; and (3) recovering the copper values from the copper pregnant organic phase.

15

10. The process of claim 9 wherein the modifier is selected from the group consisting of: alcohols, carboxylic acid esters, oximes, nitriles, ketones, amides, carbamates, sulfoxides, ureas, and phosphine oxides.

20 11. The process of claim 9 wherein the modifier is selected from the group consisting of nitriles, ether nitriles, di-alkyl ethers, ketones, esters, and alcohols.

25 12. The process of claim 9 wherein the extraction reagent composition is further comprised of an  $\alpha$ -hydroxy oxime, an  $\alpha,\beta$ -dioxime or a combination thereof as a kinetic additive.

13. The process of claim 12 wherein the  $\alpha$ -hydroxy oxime is 5,8-diethyl-7-hydroxy dodecane-6-oxime.

30

14. The process of claim 12 wherein the dioxime is a mixture of 1-(4'-alkylphenyl)-1,2-propanedione dioximes.

15. The process of claim 9 wherein the extractant is 5-nonylsalicylaldoxime, 5-dodecylsalicylaldoxime, 5-octylsalicylaldoxime, 5-heptylsalicylaldoxime, and the 2-hydroxy-5-nonylacetophenone oxime and mixtures thereof.

5

16. The process of claim 9 wherein the modifier is 2,6,8-trimethyl-4-nonanone.

17. A method of making a low viscosity extraction reagent comprising adding to an extractant selected from the group consisting of an aldoxime, a ketoxime or a modifier having a Brookfield viscosity of equal to or less than about 5 centapoise at 25°C and a flash point equal to or greater than about 141°F wherein the molar ratio of modifier to extractant is from about 0.05 to about 2.0 so as to provide a net copper transfer greater than that achieved in the absence of modifier.

15

18. The process of claim 17 wherein the modifier is selected from the group consisting of: alcohols, carboxylic acid esters, oximes, nitriles, ketones, amides, carbamates, sulfoxides, ureas, and phosphine oxides.

20

19. The process of claim 17 wherein the modifier is selected from the group consisting of nitriles, ether nitriles, di-alkyl ethers, ketones, esters, and alcohols.

20. The process of claim 17 wherein the kinetic additive is an  $\alpha$ -hydroxy oxime, an  $\alpha,\beta$ -dioxime or a combination thereof.

25

21. The process of claim 20 wherein the  $\alpha$ -hydroxy oxime is 5,8-diethyl-7-hydroxy dodecane-6-oxime.

30

22. The process of claim 20 wherein the dioxime is a mixture of 1-(4'-alkylphenyl)-1,2-propanedione dioximes.

23. The process of claim 17 wherein the extraction reagent composition is further comprised of an  $\alpha$ -hydroxy oxime, an  $\alpha,\beta$ -dioxime or a combination thereof as a kinetic additive.
- 5 24. The process of claim 17 wherein the modifier is 2,6,8-trimethyl-4-nonanone.